IN THE DESCRIPTION

Replace pages 4 and 5 with the following:

Figure 2 is a perspective view of a one-part bearing incorporated in the turbocharger of Figure 1;

Figure 3 is an axial section through the bearing of Figure 2;

Figure 4 is a section on the line 4-4 of Figure 3;

Figure 5 is section on the line 5-5 of Figure 3; and

Figure 6 is a section showing one possible modification of the bearing of Figure 2.

Detailed Description of the Preferred Embodiments

Referring to Figure 1, the illustrated turbocharger comprises a shaft 1 which supports at one end a turbine 2 and supports at the other end a drive gear 3. The shaft 1 is supported in a one piece tubular bearing 4 which is supported within a housing 5. The housing 5 is secured to a body 6 which defines a volute 7 through which exhaust gases delivered from an internal combustion engine pass to apply torque to the turbine 2. A heat shield 8 protects the bearing assembly from the hot gases which drive the turbine 2.

One end of the bearing 4 abuts a shoulder 9 defined by the shaft whereas the other end of the bearing 4 abuts a flange 10 which forms part of a thrust bearing which maintains the axial position of both the bearing 4 and the shaft 1. Flange 10 is part of an integral sleeve 11a telescoped over an integral

extension 1a of shaft 1. A second flange 10a is also telescoped over extension 1a, as is the gear 3. A nut 3a sandwiches gear 3 and flanges 10, 10a to capture, with appropriate axial clearance, a thrust bearing plate 4a which limits axial excursions of the shaft 1 and turbine 2. The thrust bearing plate is supplied with pressurized oil from main oil drilling 5a which receives suitable pressurized oil through an inlet 5b. Internal passage 4b allows pressurized oil from oil drilling 5a to provide a film between thrust bearing plate 4a and adjacent flanges 10 and 10a. The structure of the bearing 4 is shown in greater detail in Figures 2 to 5.

Referring to Figures 2 to 5, the bearing 4 defines a first bearing having an inner bearing surface 11 and an outer bearing surface 12 and a second bearing having an inner bearing surface 13 and an outer bearing surface 14. There is a clearance between the outer bearing surfaces 12, 14 and the housing 5. The surfaces 11, 12, 13 and 14 are defined at the ends of a tubular body having a central section 15 the inner and outer diameters of which are more and less than the diameters of the inner bearing surfaces 11, 13 and the outer bearing surfaces 12, 14, respectively. Passageways 16a connects oil drilling 5a with oil passageways 16 which extend between the inner and outer bearing surfaces. Pressurized oil from oil drilling 5a provides a film of oil between bearing surfaces 12, 14 and the housing 5 and between bearing surfaces 11, 13 and shaft 1. Oil drainage apertures 17 are provided in the central section 15 to ensure that oil can drain freely from the inner bearing surfaces. Axial ends 18 of the tubular bearing structure have the same outer diameters as the outer bearing surfaces 12, 14 and greater internal diameters than the inner bearing surfaces 11, 13.

Given that the bearing 4 is formed in one piece, the bearings defined at opposite ends thereof must rotate at the same speed. Thus the rotational speed of the bearing surfaces supporting the end of the shaft adjacent the gear 3 must be the same as the rotational speed of the bearing surfaces supporting the end of the shaft adjacent the turbine 2. Thus high loads at the end of the shaft adjacent the gear 3 are prevented from slowing down and thereby reducing the load carrying capacity of the adjacent bearing surfaces.

In the illustrated example the bearing 4 is made from a single component. The central section 15 of this single component has an internal diameter greater than that of the turbocharger shaft and an external diameter less than that of the adjacent housing so as to avoid hydrodynamic drag resisting rotation of the shaft. This may not, however, be necessary in all embodiments of the invention. Rather, the proportions of the central section 15 of the bearing may be varied in order to give the correct hydrodroynamic force balance on the bearing. For example, it may not be necessary to provide a recess along the inner diameter in order to maximise the bearing speed. Thus, in alternative embodiments of the invention the inner diameter of the central section 15 may be smaller or larger than that illustrated and for instance may be equal to the diameter of the surfaces 11 and 13. Similarly, the outer diameter of the central section 15 may be smaller or larger than illustrated and may for instance be equal to the diameter of the surfaces 12 and 14.